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PENSOFT

New records and range extension of *Euphractus sexcinctus* (Linnaeus, 1758) (Cingulata, Chlamyphoridae) in Rondônia state, Brazil

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Abstract

We report two new records of occurrence of Six-banded Armadillo, *Euphractus sexcinctus* (Linnaeus, 1758), in the state of Rondônia, Brazil, based on roadkills. These new records extend the geographic distribution of this species by 70 km. The records are from the region with a high deforestation rate called the "Arc of Deforestation", which includes the state of Rondônia. *Euphractus sexcinctus* was recorded in an area with a high loss of vegetation cover, where the forest is being converted to pasture.

Keywords

Amazon, roadkills, biogeography, distribution, roads, mammals, Six-banded Armadillo

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Introduction

The Six-banded Armadillo, *Euphractus sexcinctus* (Linnaeus, 1758), is a medium-sized Neotropical xenarthran mammal weighing approximately 7 kg (Superina and Abba 2018). According to Dalponte and Tavares-Filho (2004), its diet is composed of plant material, insects, arachnids, and vertebrates, with plants the majority and most diverse food. In the Cerrado biome, the estimated density of this species, which exhibits no clear habitat preference, is 0.14 individuals/ha (Bonato et al. 2008).

Euphractus sexcinctus is distributed in Argentina, Brazil, Bolivia, Paraguay, Suriname, and Uruguay (Abba et al. 2014). In Brazil it can be found in all biomes (Paglia et al. 2012) and is the armadillo species with the largest geographic distribution (Santos et al. 2019). Several records have extended the known distribution of this species (e.g., Andrade et al. 2006; Lima et al. 2010), indicating a disjunct geographical distribution, especially in the northwestern of its distribution in the Brazilian Amazon (Silva Júnior and Nunes 2001).

The Amazon lowland region, which encompasses the state of Rondônia, is considered one of the hotspots of diversity for xenarthrans (Feijó et al. 2022). The expansion of agribusiness in the Amazon region, with associated burning of forest, is a direct threat to xenarthrans (Silva et al. 2020). Although some species of the xenarthrans occurring in the Amazon, including *E. sexcinctus*, show tolerance to habitat degradation, the maintenance of forest remnants in areas of severe vegetation loss is

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essential to the persistence of this group (Teixeira-Santos et al. 2020).

According to Abba et al. (2014), *E. sexcinctus* is listed as Least Concern, presenting population stability, although one of its main threats is hunting. Throughout its distribution, this species suffers different pressures. It is one of the main species hunted in the semiarid region of Brazil due to its size and caloric energy return (Mendonça et al. 2015; Alves et al. 2016; Chaves et al. 2020; Borges et al. 2021), and it one of those with the highest incidents of roadkills (Cáceres 2011; Carvalho-Roel et al. 2019).

In Brazil, *E. sexcinctus* has been recorded in the state of Rondônia in a study on roadkilled vertebrates on State Highway 383 connecting the municipalities of Cacoal and Alta Floresta D'Oeste (Turci and Bernade 2009). In that study, 3,300 km were surveyed and 25 individuals of *E. sexcinctus* were recorded; this was the main species of mammal run over, at a rate of 0.007 individuals/km traveled (Turci and Bernade 2009). Using roadkill records and linear transects, Santos et al (2019) indicated the occurrence of *E. sexcinctus* in four other municipalities in Rondônia: Espigão do Oeste, Chupinguaia, Pimenta Bueno, and Parecis. Santos et al.'s (2019) records of this species are south of those made by Turci and Bernarde (2009), with the latter representing the most northwestern record of the species in Brazil published.

Methods

Our records of *Euphractus sexcinctus* (Fig. 1) were made during a survey of roadkills in the municipality of Presidente Médici and Cacoal, Rondônia, Brazil. The site is located on Federal Highway BR-364, which passes through rural properties devoted to agriculture and cattle ranching. Because of the constant traffic of automobiles on this single-lane highway, several animals end up being run over. To record the individuals of *E. sexcinctus*, we drove along the road at a constant speed of 60 km/h and photographed the carcasses using a Nikon P900 camera. No biological material was collected. We produced the map (Fig. 2) using QGIS v. 3.18.1-Zürich (QGIS Development Team 2021) using the plugin MapbiomasCollection. We used the IUCN distribution map (Abba et al. 2014) as a basis for the previously known distribution of *E. sexcinctus* and incorporated updates by Santos et al. (2019) from our the study area.

Results

***Euphractus sexcinctus* (Linnaeus, 1758)**
Figures 1, 2

New record. BRAZIL – **Rondônia** • Presidente Médici; −11.3580, −061.8503; 160 m elev; 03.VIII.2019; R.A.P. Barbosa (photograph.); 1 adult (♂). • Cacoal; −11.4364, −061.5940; 193 m elev; 01.II.2022; R.A.P. Barbosa (photograph); 1 adult (♂).

The two adult individuals of this species were observed roadkilled on Federal Highway BR-364 in the "Arc of Deforestation". These roadkills were in areas with high deforestation rates, where the vegetation had been converted mainly to pasture for cattle ranching. The region has no protected areas, and the nearby forested areas are isolated in the pasture matrix.

Identification. The identification and differentiation from other armadillo species were based on the presence of a single row of large nuchal scuts behind the head shield that is no wider than the space between the ears; there is no mobile band on the anterior margin of the scapular shield. The carapace is pale yellow. There are many bristles all over the carapace, which gives this species its main distinguishing characteristic and the popular name of the "tatu peludo" in some localities. There is a large head, which is more rectangular than in other armadillo species, and the number of mobile bands varies between six and seven (Redford and Wetzel 1985).

Discussion

The two new records from the central region of Rondônia state extend the distribution of *E. sexcinctus* westward

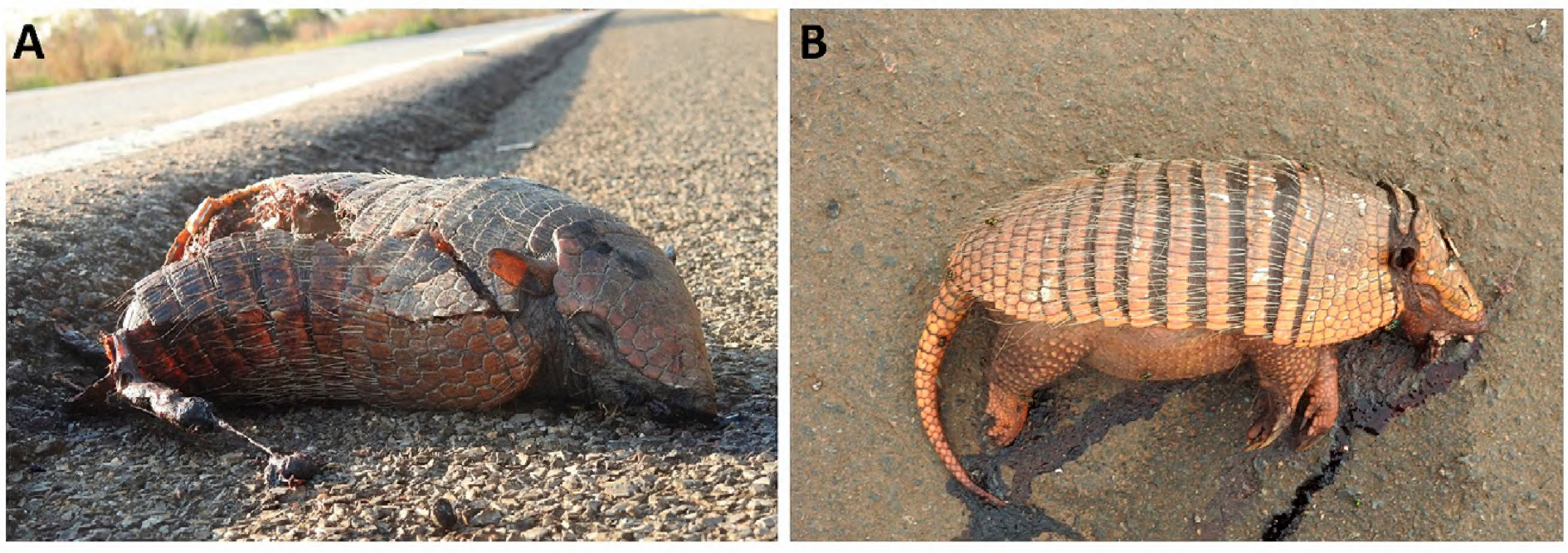

Figure 1. *Euphractus sexcinctus*: adults recorded in the municipality of (**A**) Presidente Médici, and (**B**) Cacoal, municipalities of Rondônia. Photo credits: RAPB.

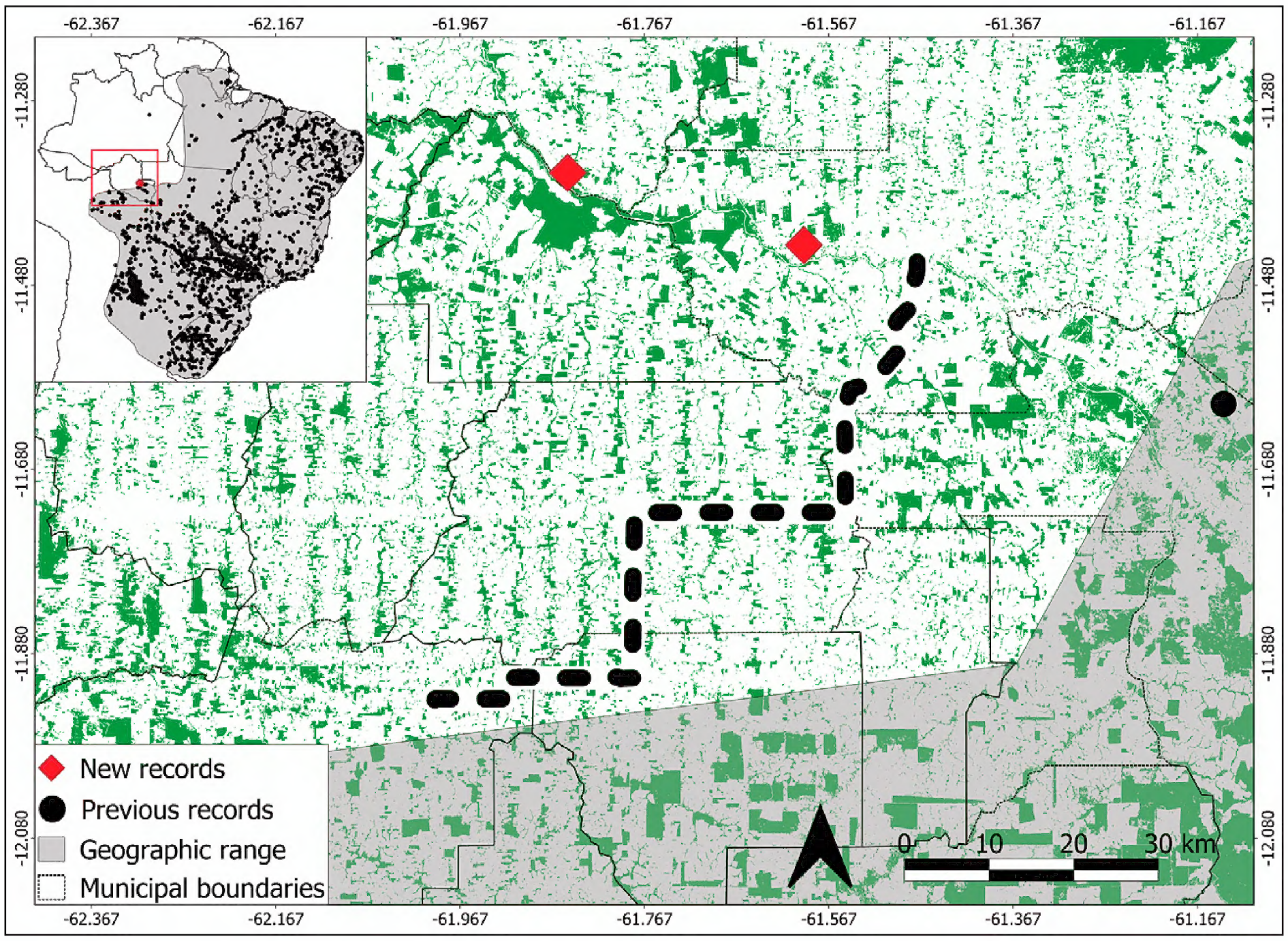

Figure 2. New records of *Euphractus sexcinctus* from the Brazilian state of Rondônia. Previous records compiled from Turci and Bernarde (2009) and Santos et al (2019).

by approximately 70 km. Published studies indicate that there is a large void of information on the distribution of mammals in the Amazon (Santos et al. 2019; Nagy-Reis et al. 2020), and this suggests that the species' disrupted distribution is more likely due to a lack of surveys than environmental preference, a possibility reinforced by a record in the central Amazon region (Santos et al. 2019).

The central region of Rondônia includes the portion of the Amazon with the highest rates of deforestation (Instituto Socioambiental 2019). The forests in Rondônia have been replaced by pastures, monoculture, and fish farming ponds. The remaining forest fragments are restricted to small, protected areas within rural properties, which include legal reserves and areas of permanent preservation, which are not necessarily connected. Rondônia has eight vegetational typologies, with our new records located near a transition belt between the Amazon Rainforest and the Cerrado (Bentes-Gama et al. 2007). The forecast for deforestation in Rondônia, assuming a pessimistic scenario, indicates that by 2050 47% of the state's native forest will be cleared (Piontekowski et al. 2019).

In Rondônia, armadillos are hunted for food and to produce animal medicines (Ramos et al. 2020; Oliveira et al. 2021). Roadkills, combined with a highly anthropomorphized landscape, can cause significant impacts on the survival of the *E. sexcinctus* in the central portion of the state. Further studies should be prioritized in the forest fragments in this area with the aims to elucidate the density, movement pattern, habitat preference, and reproduction of *E. sexcinctus*.

In conclusion, we extend the geographic distribution of this species approximately 70 km northwest of its previously known records. We also highlight habitat loss and the presence of highways as real threats to the persistence of the species in central Rondônia.

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Authors' Contributions

Conceptualization: RAPB, MAO. Data curation: RAPB, MAO. Investigation: RAPB. Methodology: RAPB. Writing – original draft: RAPB, MAO. Writing – review and editing: RAPB, MAO.

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